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(54) Disposable diaper

Wegwerfwindel

Couche culotte jetable

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Description

The present invention relates to a disposable diaper, more particularly to pants-type disposable diaper.

It is well known for pants-type disposable diapers comprising heat-weldable top- and backsheets to seal front and rear bodies to each other by means of heat welding along transversely opposite sides of front and rear waist sections. For example, EP-A-0 531 666 (& JP-A-05 0 15 551), of which the applicant is the same as the applicant of the present application, discloses a sealing technique for pants-type diapers, by which a series of intermittent rectangular welded zones each having a long side extending in parallel to a waist line of the diaper are longitudinally arranged along each lateral side of the front and rear waist sections utilizing an ultrasonic welding. Use of this technique enables the diaper put on a wearer to be easily stripped off merely tearing off the diaper along the sealed side edges of the diaper. This technique is advantageous also in that the interior of the diaper is always maintained in good communication with the exterior of the diaper and thereby a diaper of high air-permeability is obtained.

Tearing off tends to take place along a peripheral edge of each welded zone as the diaper is torn off. The sheets usually used to form the diaper comprise a thin nonwoven fabric or a plastic film of a relatively small weight per unit area and a correspondingly low tear strength, since, after the sheets have been welded to each other, the welded zone exhibits a tear strength higher than that exhibited by the nonwelded zone and a tearing force is concentrated along a boundary between the welded zone and the nonwelded zone. Consequently, there is an apprehension that a tear might progress circumferentially, i.e., transversely into the front and/or rear bodies as the diaper is torn off along the long side of each rectangular welded zone, instead of being torn longitudinally of the diaper. Such undesirable phenomenon will readily occur particularly when both the top- and backsheets have a tear strength in the transverse direction significantly lower than a tear strength in the longitudinal direction. Unless the diaper is torn off in the longitudinal direction, it will be impossible to relieve the wearer from the diaper as quickly as possible.

Accordingly, a principal object of the invention to solve the problem as has been mentioned above by providing a diaper with welded zones at least partially defined by patterns each having contours diverging transversely of the diaper so that the diaper may be easily torn off along such contours obliquely downwards.

To achieve the object set forth above, the invention consists in a disposable diaper comprising a liquid - permeable topsheet, a liquid-impermeable backsheet and a liquid-absorbent core sandwiched between said sheets which are heat-weldable, and forming front and rear bodies, said front and rear bodies providing front and rear waist sections having transversely opposite side portions defined by portions extending outwards from transversely opposite side edges of said liquid-absorbent core, said front and rear bodies being sealed to each other along said side portions by a series of intermittent welded zones arranged longitudinally along the respective side portions, characterized in that said welded zones are at least partially defined by patterns each having an outer contour formed substantially in a V-shape laid down transversely of the diaper or an arc shape opening transversely of said diaper.

With the disposable diaper constructed as has been described above, the top- and backsheets are torn off obliquely along contours of each welded zone diverging transversely of the diaper, instead of being torn off circumferentially of the waist, as the waist side portions are torn off.

The invention will be readily apparent from the following description of preferred embodiments with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view showing a disposable diaper according to an embodiment of the invention;
Fig. 2 is a perspective view showing the diaper as developed in longitudinal direction;
Fig. 3 is a fragmentary plan view showing an embodiment of welded zones in the diaper in an enlarged scale;
Fig. 4 is a view similar to Fig. 3 showing another embodiment of the welded zones;
Fig. 5 is a view similar to Fig. 3 showing yet another embodiment of the welded zones; and
Fig. 6 is a view similar to Fig. 3 showing a still further embodiment of the welded zones.

Referring to Figs. 1 and 2, a blank 1A of a diaper 1 comprises a liquid-permeable topsheet 2, a liquid-impermeable backsheet 3 and a liquid-absorbent core 4 sandwiched between these two sheets 2, 3,and is generally composed of a front body 5, a rear body 6 and a crotch zone 7. The topsheet 2 is formed by a nonwoven fabric of thermoplastic fibers, the backsheet 3 is formed by a thermoplastic film, and these two sheets 2, 3 are heat-weldable to each other. Referring to Fig. 2, portions of the top- and backsheets 2, 3 extending outwards from the peripheral edge of the liquid-absorbent core 4 are itermittently bonded to each other by means of adhesive (not shown) in the diaper blank 1A. The diaper blank 1A may be folded inwards in two along a longitudinally middle line X - X and transversely opposite side edges of the front and rear bodies 5, 6, formed by portions of the top- and backsheets 2, 3 extending outwards from transversely opposite side edges of the liquid-absorbent core 4 and lying one upon another, may be sealed together by series of respective side edges to form the diaper 1 into pants type. The diaper 1 thus formed has a waist-opening 11 and a pair of leg-openings 12. These openings 11, 12 are provided along their

peripheries with a plurality of parallel elastic members 13, 14 bonded to said peripheries, respectively, in their stretched condition.

Referring to Fig. 3, the elastic members 13 shown in the upper portion of the waist side edge are associated with the waist-opening 11 and the elastic members 14 shown in the lower portion of the waist side edge are associated with the leg-openings 12. The welded zones 10 comprise first rectangular welded patterns 17 intermittently provided between each pair of adjacent elastic members 13 for the waist-opening and adjacent the uppermost elastic member 13 and having their long sides 17A extending in parallel to the elastic members 13, second rectangular welded patterns 18 intermittently provided between each pair of adjacent elastic members 14 for the leg-openings and adjacent the lowermost elastic member 14 and having their long sides 18A extending in parallel to the elastic members 14, and third laid down V-shaped welded patterns 19 intermittently provided between the lowermost elastic member 13 and the uppermost elastic member 14. Each of said first and second welded patterns 17, 18 is a rectangular welded zone dimensioned to be 0.3 to 2mm X 3 to 10mm(height X length) and each of the third welded patterns 19 is a V-shaped welded zone described by a welded line being 0.3 to 1.5mm wide and dimensioned to have an included angle C = 15 to 90° and a length D = 3 to 10mm. All of the welded patterns 17, 18, 19 are spaced by d = 0.5 to 3mm one from another and non-welded zones defined between each pair of adjacent patterns contribute to promote a fluid communication between the interior and exterior of the diaper, improving the desired air-permeability of the diaper.

With the diaper 1 shown by Fig. 1, the diaper 1 can be torn off longitudinally down along the welded zones 10 by pulling the front and rear bodies 5, 6 in directions as indicated by arrows A, B with the waist-opening gripped in the hands and thereby a wearer can be easily relieved from the diaper 1. The welded zones 10 of the diaper 1 generally have a tear strength higher than that of the top- and backsheets 2, 3, so the top- and backsheets 2, 3 are torn off along the outer peripheries of the first, second and third welded patterns 17, 18, 19 as the front and rear bodies are pulled in the directions A, B. In other words, the top- and backsheets 2, 3 tend to be torn off transversely along the first and second welded patterns 17, 18 and tend to be torn off in a V-shape along each of the third welded patterns 19 and thereby to be torn off obliquely downwards in a zigzag along the series of V-shaped patterns 19. Particularly when fibers and/or polymers in the top- and backsheets 2, 3 are oriented transversely of the diaper 1 and these sheets 2, 3 tend to be torn off transversely of the diaper due to such orientation, there is an apprehension that the sheets 2, 3 might be torn off along the first and second welded patterns 17, 18 into the front and/or rear bodies. However, according to this embodiment of the diaper 1, the first and second welded patterns 17, 18 are located as adjacent as possible to the elastic members 13 for the waist-opening and the elastic members 14 for the leg-openings so that such apprehension may be minimized and the major portions of the respective waist side edges are sealed only by the third welded patterns 19 so that the top- and backsheets 2, 3 may be easily torn off longitudinally but not transversely of the diaper 1. While it is possible to replace the first and second welded patterns 17, 18 by the third welded patterns 19, the V-shaped patterns 19 might cross and cut the elastic members 13, 14 or the elastic members 13, 14 might impede quick welding of the top- and backsheets 2, 3 depending on the distance by which the elastic members 13, 14 are spaced one from another, respectively.

Figs. 4, 5 and 6 are views similar to Fig. 3 showing various embodiments of the third welded pattern 19. Referring to Fig. 4, the laid down V-shaped third welded pattern 19 diverges towards the center of the diaper 1. The V-shape may be devoid of its sharp point. Referring to Fig. 5, the third welded pattern 19 is an arc opening transversely of the diaper 1 and its orientation is alternated, which is a modified form of the V-shaped pattern 19 shown in Figs. 3 and 4. Referring to Fig. 6, the third welded pattern 19 is a rhombus formed by two laid down V-shaped contours one of which diverges towards the center of the diaper 1 and the other diverges in the opposite direction. While the third welded patterns 19 may be continuous one to another, instead of being intermittently arranged as exemplarily shown by Figs. 3 through 6, such continuous arrangement of the third welded patterns 19 will deteriorate the air-permeability of the diaper 1.

According to the invention, the heat-weldable top- and backsheets 2, 3 may be subjected to embossing or ultrasonic welding to obtain the first, second and third welded patterns 17, 18, 19. The topsheet 2 may be formed by a nonwoven fabric made of thermoplastic fibers or a porous thermoplastic film and the backsheet 3 may be formed by a thermoplastic film, a nonwoven fabric or a laminate of a nonwoven fabric and a plastic film. The liquid-absorbent core 4 may be formed by the well known materials conventionally used for this component.

In the disposable diaper according to the invention, the front and rear bodies are welded together along the transversely opposite side edges of the front and rear waist sections and this welding is achieved by the welded zones comprising the intermittent patterns each having contours of V-shape or V-shape devoid of its sharp point, both laid down transversely of the diaper or patterns each having contours of circular arc opening transversely of the diaper. Accordingly, when the diaper is torn off along the waist side edges to relieve a wearer from the diaper, the top- and backsheets are torn off obliquely downwards along said contours rather than being torn off circumferentially of the waist. In this manner, no failure of tearing off occurs.

Claims

1. A disposable diaper comprising a liquid-permeable topsheet (2), a liquid-impermeable backsheet (3) and a liquid-absorbent core (4) sandwiched between said sheets (2, 3) which are heat-weldable, and forming front and rear bodies (5, 6), said front and rear bodies (5, 6) providing front and rear waist sections having transversely opposite side portions defined by portions extending outwards from transversely opposite side edges of said liquid-absorbent core (4), said front and rear bodies (5,6) being sealed to each other along said side portions by a series of intermittent welded zones (10) arranged longitudinally along the respective side portions, characterized in that said welded zones (10) are at least partially defined by patterns (19) each having an outer contour formed substantially in a V-shape laid down transversely of the diaper or an arc shape opening transversely of said diaper.

2. A disposable diaper according to claim 1, wherein said outer contour is devoid of the sharp point of the V-shape.

3. A disposable diaper according to claim 1 or 2, including elastic members (13, 14) provided along peripheries of the waist and leg openings (11, 12) of the diaper and wherein said welded zones (10) are provided between the lowermost one of the elastic members (13) provided along the peripheries of the waist-opening (11) and the uppermost one of the elastic members (14) provided along the peripheries of the leg-openings (12).

4. A disposable diaper according to claim 3, wherein said welded zones (10) include further patterns (17, 18) intermittently provided between the elastic members (13, 14).

5. A disposable diaper according to claim 4, wherein said further patterns (17, 18) are each substantially rectangular in shape.

Patentansprüche

1. Wegwerfwindel, die eine flüssigkeitsdurchlässige Oberschicht (2) umfasst, eine flüssigkeitsundurchlässige Unterschicht (3) und einen flussigkeitsabsorbierenden Kern (3), der zwischen den Schichten (2, 3) gelagert ist, die durch Wärme geschweisst werden können und vordere und hintere Körper (5,6) bilden, wobei die vorderen und hinteren Körper (5, 6) vordere und hintere Taillenabschnitte mit quer gegenüberliegenden Seitenteilen liefern, die von Teilen definiert sind, die sich von quer gegenüberliegenden Seitenkanten des flüssigkeitsabsorbierenden Kerns (4) nach aussen erstrecken, wobei die vorderen und hinteren Körper (5, 6) entlang den Seitenteilen durch eine Reihe von unterbrochen geschweissten Zonen (10), die längs entlang den entsprechenden Seitenteilen angeordnet sind, miteinander abgedichtet sind, dadurch gekennzeichnet, dass die geschweissten Zonen (10) wenigstens teilweise von Mustern (19) definiert sind, die jeweils ein äusseren Umriss haben, der im wesentlichen in einer V-Gestalt gebildet ist, die quer von der Wegwerfwindel abgelagert ist, oder einer Bogengestalt, die sich quer von der Wegwerfwindel öffnet.

2. Wegwerfwindel nach Anspruch 1, in der der äussere Umriss von der schaffen Stelle der V-Gestalt frei ist.

3. Wegwerfwindel nach Anspruch 1 oder 2, die elastische Glieder (13, 14) einschliesst, die entlang Peripherien der Taillen- und Beinöffnungen (11, 12) der Windel vorgesehen sind, und in der geschweisste Zonen (10) zwischen dem untersten, entlang den Peripherien der Taillenöffnung (11) vorgesehenen elastischen Gliedern (13), und dem obersten, entlang den Peripherien der Beinöffnungen (12) vorgesehenen elastischen Gliedern (14) vorgesehen sind.

4. Wegwerfwindel nach Anspruch 3, in der die geschweissten Zonen (10) weitere Muster (17, 18) einschliessen, die unterbrochen zwischen den elastischen Gliedern (13, 14) vorgesehen sind.

5. Wegwerfindel nach Anspruch 4, in der die weiteren Muster (17, 18) jeweils eine im wesentlichen rechteckige Gestalt haben.

Revendications

1. Couche jetable comportant une nappe supérieure perméable au liquide (2), une nappe de fond imperméable au liquide (3) et un noyau absorbant de liquide (4) pris en sandwich entre lesdites nappes (2, 3) qui admettent une soudure thermique, et formant des corps avant et arrière (5, 6), lesdits corps avant et arrière (5, 6) assurant les éléments avant et arrière à la taille ayant des portions latérales opposées transversales définies par des portions qui s'étendent vers l'extérieur à partir de bords latéraux transversaux dudit noyau perméable au liquide (4), lesdits corps avant et arrière (5,6) étant soudés l'un à l'autre le long desdites portions latérales par une série de zones soudées par intermittence (10) disposées en longueur le long des portions latérales respectives, caractérisé en ce que lesdites zones soudées (10) sont au minimum partiellement définies par des motifs (19) dont cha-

cun ayant un contour extérieur formé essentiellement en forme de Vé disposé en sens transversal de la couche ou en arc de cercle ouvert en sens transversal de ladite couche.

2. Couche jetable selon la revendication 1, dont ledit contour extérieur est libre de pointe aiguë de la forme en Vé.

3. Couche jetable selon la revendication 1 ou 2, y compris les éléments élastiques (13, 14) prévus sur le pourtour de la taille et des ouvertures pour les jambes (11, 12) de la couche et dont les zones soudées (10) sont prévues entre l'élément élastique inférieur (13) prévu le long des pourtours des ouverture de taille (11) et l'élément supérieur des éléments élastiques (14) prévu le long des pourtours des ouvertures de jambe (12).

4. Couche jetable selon la revendication 3, dont les zones soudées (10) comportent d'autres motifs (17, 18) prévus par intermittence entre les éléments élastiques (.3, 14).

5. Couche jetable selon la revendication 4, dont lesdits autres motifs (17, 18) sont chacun essentiellement de forme rectangulaire.

FIG.1

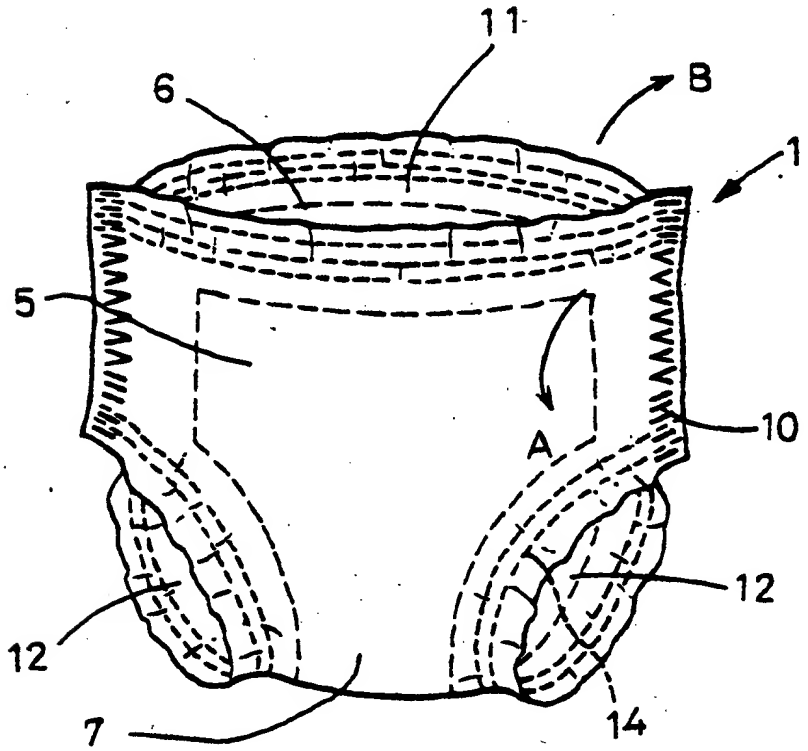

FIG.2

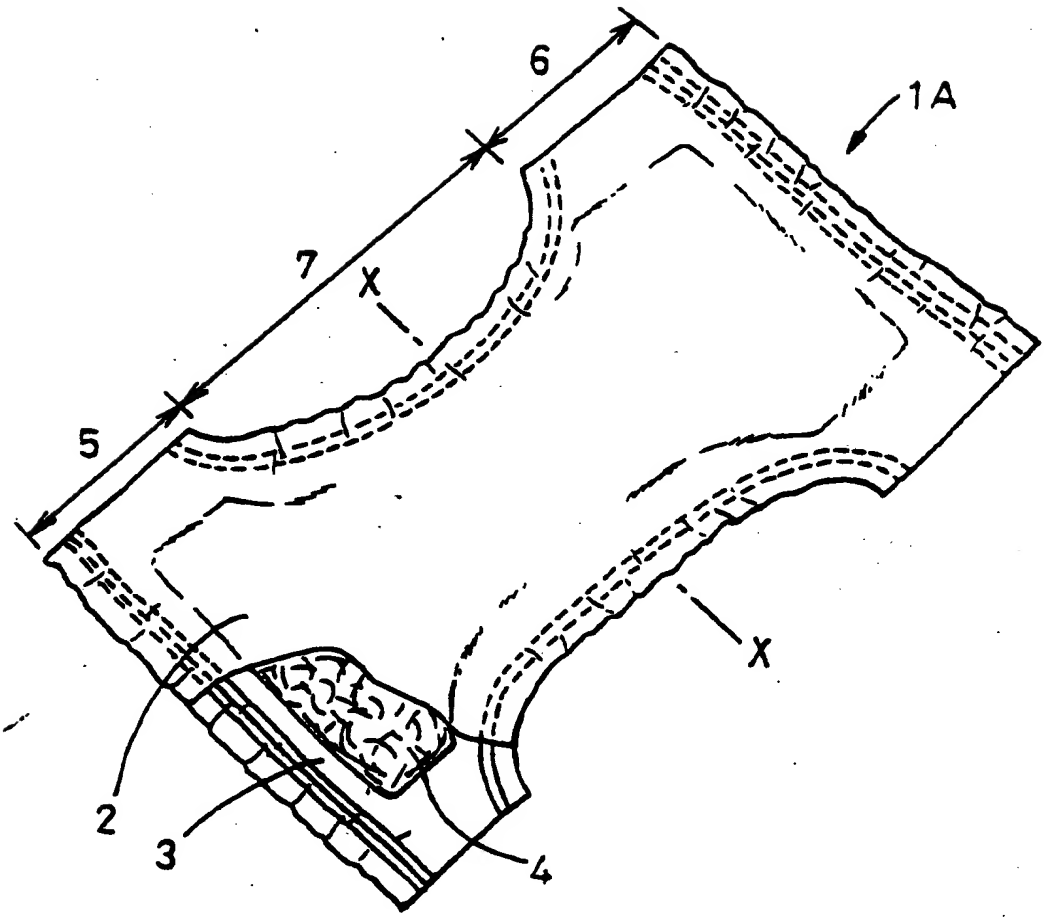

FIG.3

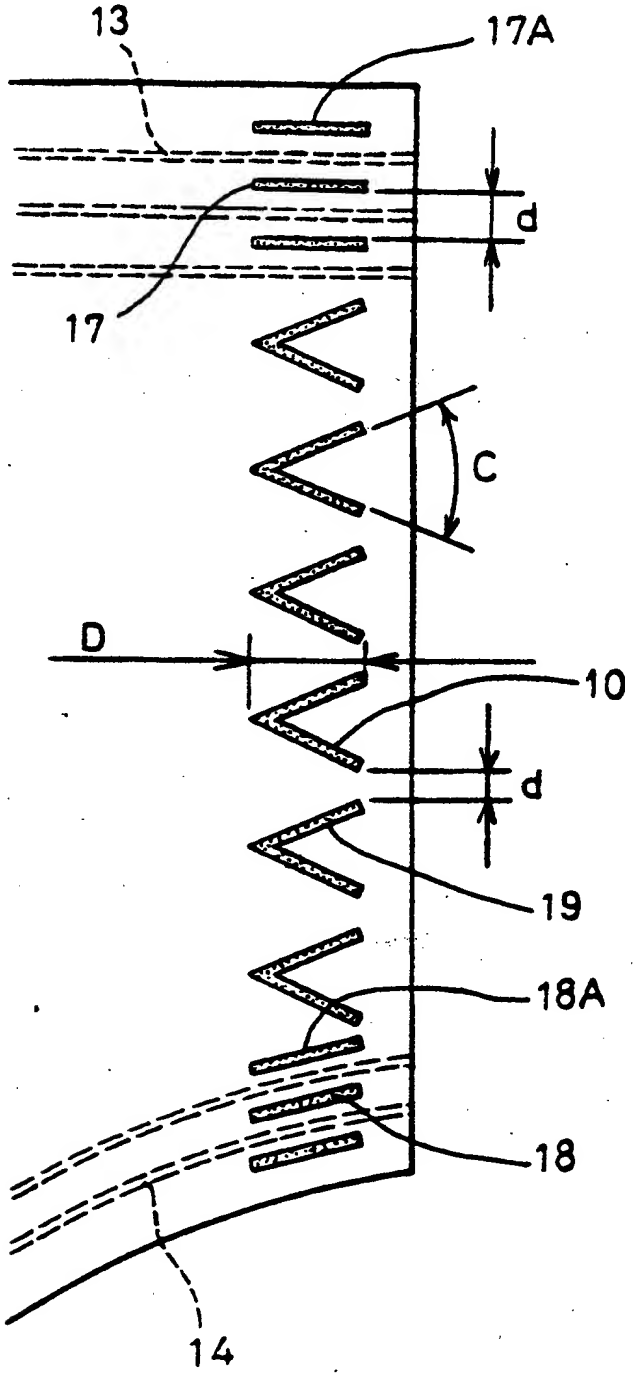

FIG.6

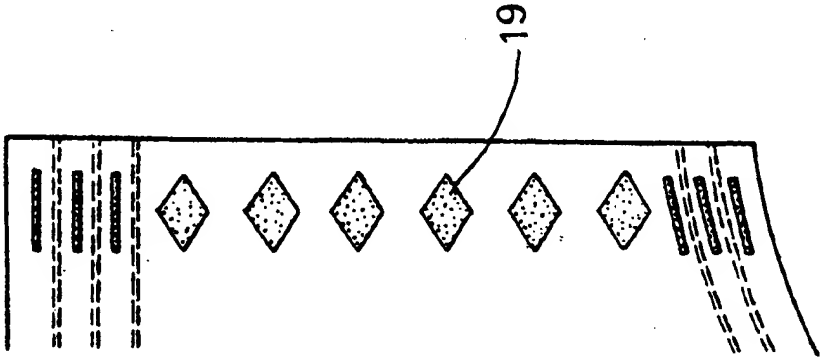

FIG.5

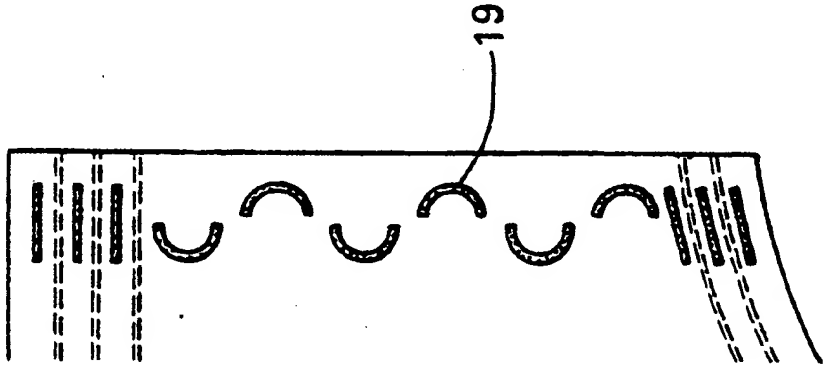

FIG.4